Baumann™ 81000 Mikroseal Control Valve

Contents

Figure 1. Baumann 81000 Control Valve

NPS 1/4 Angle Valve with Baumann 16 Actuator

NPS 1/2 Inline Valve with Baumann 16 Actuator, and FIELDVUE™ DVC2000 Digital Valve Controller

Introduction

The Baumann 81000 Mikroseal control valve (figure 1) is excellent for throttling of liquid or gaseous media. A low friction mechanical force-amplifying mechanism is used to reduce the travel of the pneumatic or electric actuators. This mechanism moves the closure diaphragm precisely against the valve orifice to throttle or stop the passing fluid.

Scope of Manual

This instruction manual includes installation, maintenance, and parts information for the Baumann 81000 Mikroseal control valve.

Do not install, operate, or maintain Baumann 81000 control valves without being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance. **To avoid personal injury or property damage, it is important to carefully read, understand, and follow all the contents of this manual, including all safety cautions and warnings.** If you have any questions about these instructions, contact your Emerson Process Management sales office before proceeding.

⚠ WARNING

Always wear protective gloves, clothing and eyewear when performing any installation operations to avoid personal injury.

Personal injury or property damage caused by sudden release of pressure or bursting of pressure retaining parts may result if service conditions exceed those for which the product was intended. To avoid injury or damage, provide a relief valve for over pressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

CAUTION

This valve is intended for a specific range of pressures, temperatures and other application specifications. Applying different pressures and temperatures to the valve could result in parts damage, malfunction of the control valve or loss of control of the process. Do not expose this product to service conditions or variables other than those for which the product was intended. If you are not sure what these conditions are you should contact your Emerson Process Management sales office for more complete specifications. Provide the product serial numbers (shown on the nameplate) and all other pertinent information.

⚠ WARNING

If you move or work on an actuator installed on a valve with loading pressure applied, keep your hands and tools away from the stem travel path to avoid personal injury. Be especially careful when removing the stem connector to release all loading on the actuator stem whether it be from air pressure on the diaphragm or compression in the actuator springs.

Likewise take similar care when adjusting or removing any optional travel stop. Refer to the relevant actuator Maintenance Instructions.

If hoisting the valve, take care to prevent people from being injured in case the hoist or rigging slips. Be sure to use adequate sized hoists and chains or slings to handle the valve.

⚠ WARNING

Personal injury could result from packing leakage. Valve packing is tightened before shipment; however, the packing might require some readjustment to meet specific service conditions.

Maintenance

⚠ WARNING

Avoid personal injury and property damage from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- **Do not remove the actuator from the valve while the valve is still pressurized.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations.**
- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.**
- **Depending on the actuator construction, it will be necessary to manage the pneumatic actuator spring pre-compression. It is essential to refer to the relevant actuator instructions in this manual to perform safe removal of the actuator from the valve.**
- **Use lock-out procedures to be sure the above measures stay in effect while you work on the equipment.**
- **The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Note

Whenever a gasket seal is disturbed by removing or shifting gasketed parts, install a new gasket during reassembly. This provides a good gasket seal because the used gasket may not seal properly.

⚠ WARNING

Avoid personal injury or property damage by thoroughly cleaning the line of all dirt, welding chips, scale, oil or grease, and other foreign material. Failure to do so could result in parts damage, malfunction of the control valve or loss of control of the process.

Installation

1. Before installing the valve in the pipeline, thoroughly clean the line of all dirt, welding chips, scale, oil or grease, and other foreign material. A micron size filter is recommended upstream of the valve.
2. Install the valve so that the controlled fluid will flow through the valve body in the direction selected from the guidelines shown below.
3. A three-valve bypass must be used to permit removal of the control valve from the line without shutting down the system.

4. A pressure gauge may be installed in the 1/8 inch port in the bolted bonnet (see figure 4). This gauge tells when leakage or breakage of the diaphragm has occurred.

⚠ WARNING

To avoid personal injury or property damage, do not attempt to do any work on a valve while the system is in operation, the valve must be isolated 100% from the active system and the isolated line voided of pressure and/or hazardous fluids.

Air Piping

1. For an air-to-extend actuator (air-to-close action), connect the actuating air pressure line to the 1/4 NPT opening in the upper diaphragm case. For an air-to-retract actuator (air-to-open action) connect the actuating air pressure line to the 1/4 NPT in the lower diaphragm case. See figures 2 and 3.
2. Use 6.4 mm (1/4 inch) O.D. tubing or equivalent for all air lines. If the air line exceeds 8 m (25 ft) in length, 9.5 mm (3/8 inch) tubing is preferred. Air pressure should not to exceed 2.5 bar (35 psig).

Flow Direction

There are two possible ways to pass fluid through the valve (see figures 6 and 7). In the flow-to-open mode, fluid enters from Port A to Port B. In the flow-to-close mode, fluid enters from Port B to Port A.

Each flow direction has its advantages and disadvantages. The following guide will make a selection easier.

Use Flow From Port B to A

- In vacuum applications with spring P/N 81168Z, vacuum on down stream.
- With fluids that have a tendency to cavitate.
- In applications where inlet pressure is low and no seat spring can be tolerated.
- When self-cleaning operation is required for removal of solid particles in flow stream.

Use Flow From Port A to B

- When valve has to fail close in case of bursting or damage to the sealing diaphragm.

Disassembly

⚠ WARNING

If there is evidence of process fluid under pressure leaking from the joint, retighten the valve body/joint nuts and return to the Warning at the beginning of the Maintenance section to provide proper steps have been taken to isolate the valve and relieve process pressure.

1. Remove the actuator by unscrewing the yoke drive nut (key 9) and lifting off the complete actuator assembly. This keeps the actuator assembly intact and calibrated to the factory setting. Refer to actuator instructions.

2. Remove the bolts (key 13) and lift the bonnet yoke assembly (key 2) with the diaphragm (key 5) and O-ring (key 15) from the valve body (key 1). Lift out the spring (key 6).
3. Remove the O-ring (key 15) and diaphragm (key 5). Wipe with a clean soft cloth and examine for wear.
4. Inspect the valve body sealing surfaces. Refer to the Lapping the Valve Seat procedure in this instruction manual.

Lapping the Valve Seat

If valve seat leakage becomes excessive, it may be necessary to lap the valve seat.

1. Use a good quality lapping compound with a mixture that contains 280 to 600 grit. Apply at several spots around the plug seating surface (refer to figure 5).
2. Thoroughly lap the valve body on a flat, preferably cast iron, surface plate.
3. Clean the seats thoroughly after lapping.
4. Inspect the diaphragm (key 5) and replace if necessary.

Bonnet Maintenance

1. Remove the actuator by unscrewing the yoke drive nut (key 9) and lifting off the complete actuator assembly. Hold the flattened portions of the bonnet yoke (key 2) in a vise and unscrew the valve bonnet (key 8) using a 2-1/4 inch wrench. Remove and inspect the bearing cartridge assembly (key 4) and O-ring (key 49).
2. Reinsert the parts, O-ring (key 49) and bearing cartridge assembly (key 4), ensuring the bearings extend below the side plate of the bearing cartridge assembly (key 4) and contact the piston subassembly (key 3). With the plunger (key 10) removed, screw the bonnet (key 8) onto the yoke (key 2). There should be no binding or galling. Tighten the bonnet with a wrench until there is metal-to-metal contact.
3. Insert the plunger (key 10) and push it in and out. The piston subassembly (key 3) should travel easily up and down.

Calibration

1. Reassemble the valve by inserting the spring (key 6), O-ring (key 15), and diaphragm (key 5) into the valve body.
2. Replace the bonnet yoke assembly (key 2) and install the bolts (key 13) and tighten. Add the jam nut (key 27) and travel indicator disk (key 58) to the plunger (key 10). Line up the plunger (key 10) in the bearing cartridge assembly (key 4). Screw the actuator onto the plunger (key 10) until the actuator yoke touches the bonnet (key 8). Lock the actuator with the drive nut (key 9).
3. To prevent damage to the plunger (key 10) or the bearing cartridge subassembly (key 4), be sure the hex jam nut (key 27) is not tightened against the travel indicator (key 58).

CAUTION

To prevent damage to the plunger (key 10) or bearing cartridge subassembly (key 4), be sure the hex jam nut (key 27) is not tightened against the travel indicator (key 58).

Do Not Attempt to Rotate the Plunger (key 10)

1. For an air-to-retract actuator (air-to-open). Apply 6.9 bar (100 psi) air pressure (or N2) to the normal valve inlet. Apply 0.2 bar (3.2 psi) air signal to the actuator. Use 0.07 bar (1 psi) signal to the actuator if the inlet pressure exceeds 6.9 bar (100 psi). If the valve leaks, slowly turn the actuator stem counterclockwise. This will move the plunger (key 10) down until leakage is below 1 cc/min. Lock the plunger (key 10) in position with the jam nut (key

27). Calibrate the travel scale and check for 12.7 mm (1/2 inch) valve travel; apply a 1.04 bar (15 psi) signal. Reverse the signal; the plunger should move in the opposite direction with less than 0.014 bar (0.2 psi) signal change.

2. For an air-to-extend actuator (air-to-close), use the same procedure as in step one, except apply 0.88 bar (12.8 psi) to the actuator to calibrate the shut off position.

Parts Ordering

When corresponding with your Emerson Process Management sales office about this equipment, always mention the valve serial number. When ordering replacement parts, also specify the key number, part name, and desired material using the following parts tables.

⚠ WARNING

Use only genuine Fisher® replacement parts. Components that are not supplied by Emerson Process Management should not, under any circumstances, be used in any Fisher valve, because they may void your warranty, might adversely affect the performance of the valve, and could cause personal injury and property damage.

Figure 2. Air-to-Extend (Air-to-Close Action)

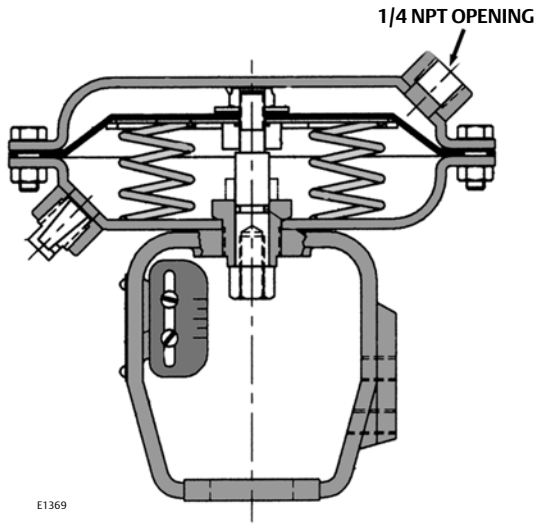

Figure 3. Air-to-Retract (Air-to-Open Action)

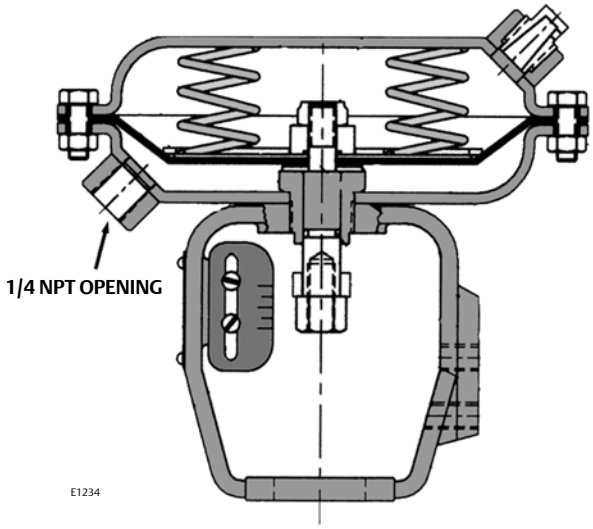

Figure 4. 1/8 Port

Figure 5. Seating Surfaces

Figure 6. Baumann 81000 NPS 1/4 Angle Valve Body

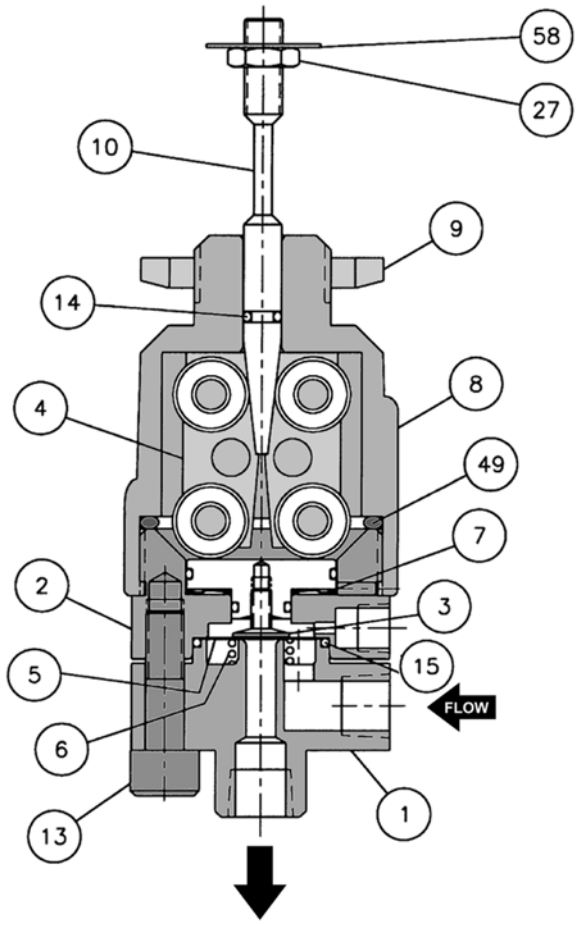

Figure 7. Baumann 81000 NPS 1/2 Inline Valve Body

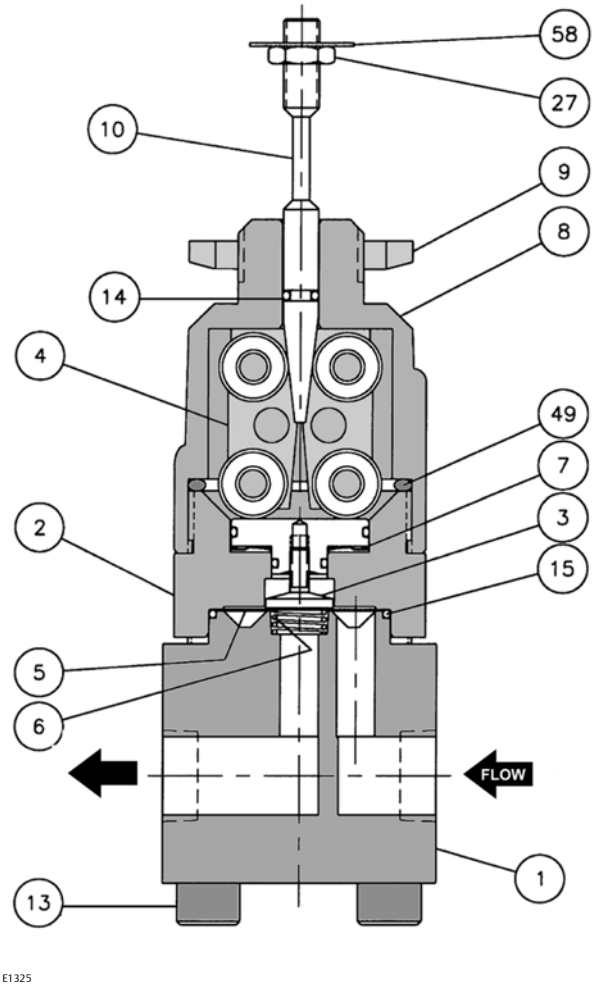

Table 1. Common Parts

Key Number	Quantity	Description	Part Number
1	1	Valve Body	Refer to table 2
2	1	Bonnet Yoke, NPS 1/2	81306
		Bonnet Yoke, NPS 1/4	81302
3	1	Piston Subassembly, NPS 1/2	81188
		Piston Subassembly, NPS 1/4	81170
4*	1	Bearing Cartridge Subassembly	81180-2
5*	1	Closure Diaphragm, NPS 1/2, 316 Stainless Steel	81145
		Closure Diaphragm, NPS 1/2, N10276 Nickel Alloy	81145-1
		Closure Diaphragm, NPS 1/4, 316 Stainless Steel	37141
		Closure Diaphragm, NPS 1/4, N10276 Nickel Alloy	37141-1
6*	1	Seat Spring	81168Z
7*	1	Wave Spring	81401
8	1	Bonnet	81205
9	1	Drive Nut, (Yoke)	011757-003-153
10*	1	Plunger	Refer to table 2
13	4	NPS 1/2, Allen head Bolt 3/8-16x2-5/8	81195S
		NPS 1/4, Allen head Bolt M8x30	81197S
14*	1	O-Ring, Plunger	81147
15*	1	O-Ring, NPS 1/2 Body (PTFE)	81165-1
		O-Ring, NPS 1/4 Body, (PTFE)	37186-1
27	1	Jam Nut	81841
49*	1	O-Ring	81206
58	1	Travel Indicator Disk	011765-002-152

Table 2. Baumann 81000 Valve Body and Plunger

PLUG TRAVEL		ORIFICE DIAMETER		DIAPHRAGM TRAVEL		81000 VALVE BODY(1) (KEY 1)		PLUNGER (KEY 10)	
Cv	Kv	mm	Inch	mm	Inch	NPS 1/2	NPS 1/4	Baumann 16 Actuator	Baumann 32 Actuator
0.01	0.009	0.635	0.025	0.1778	0.007	81504(2)	81558(2)	81193 (5°)	81933 (5°)
0.03	0.026	1.60	0.063	0.1778	0.007	81503(2)	81557(2)	81193 (5°)	81933 (5°)
0.10	0.09	7.92	0.312	0.1778	0.007	81501(2)	81555(2)	81193 (5°)	81933 (5°)
0.30	0.26	7.92	0.312	0.3810	0.015	81501(2)	81555(2)	81192 (13°)	81931 (13°)
0.50	0.43	13.2	0.520	0.0005	0.012	81507(2)	N/A	81191 (8°)	81934 (8°)
0.70	0.60	13.2	0.520	0.3810	0.015	81507(2)	N/A	81192 (13°)	81931 (13°)

1. Add the suffix of the letter "H" to the valve body part number when N10276 Nickel Alloy material is specified.
2. Refer to key 5 in table 1 for the appropriate closure diaphragm.

Figure 8. 81000 Angle Valve with Baumann 16 Actuator and FIELDVUE DVC6000 Digital Valve Controller

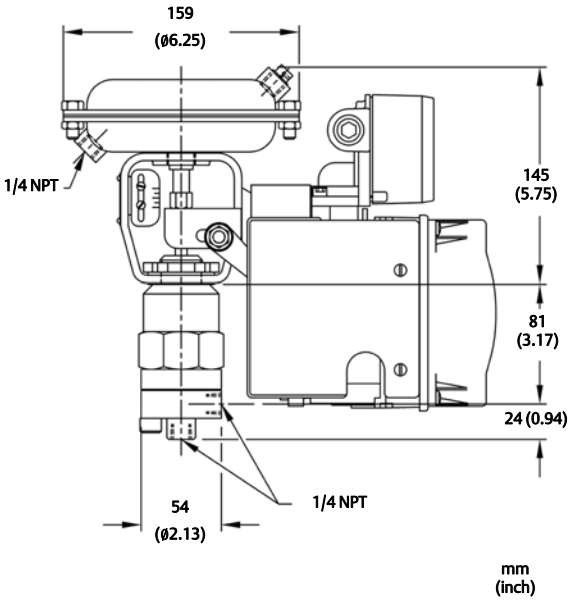

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Figure 9. 81000 Inline Valve with Baumann 16 Actuator and FIELDVUE DVC6000 Digital Valve Controller

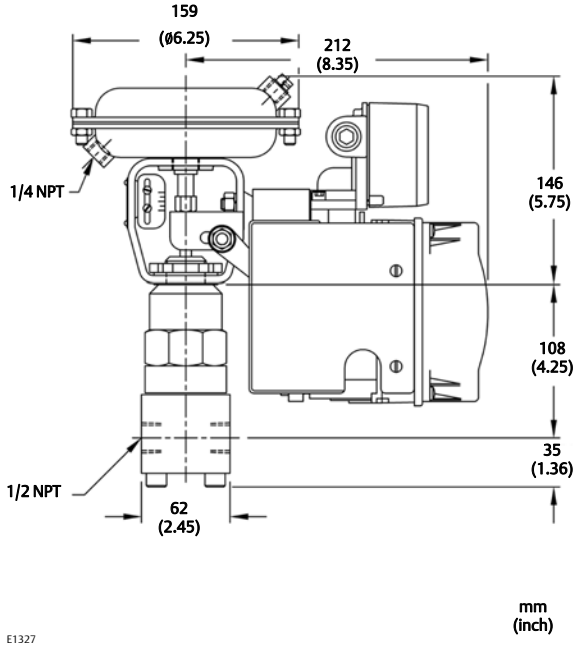

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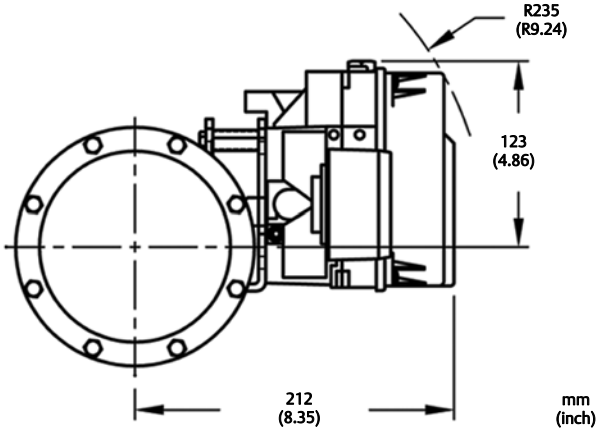
Figure 10. Baumann 16 Actuator with FIELDVUE DVC6000 Digital Valve Controller, Top View



NOTE: BAUMANN 16 ACTUATOR REQUIRES
77mm (3 Inches) VERTICAL CLEARANCE

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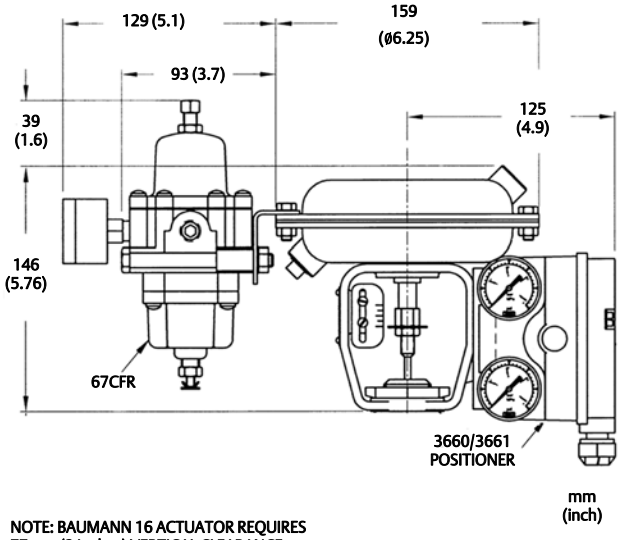
Figure 11. Baumann 16 Actuator with Fisher 3660/3661 and 67CFR Airset



NOTE: BAUMANN 16 ACTUATOR REQUIRES
77mm (3 Inches) VERTICAL CLEARANCE

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Figure 12. Baumann 16 Actuator with FIELDVUE DVC2000 Digital Valve Controller

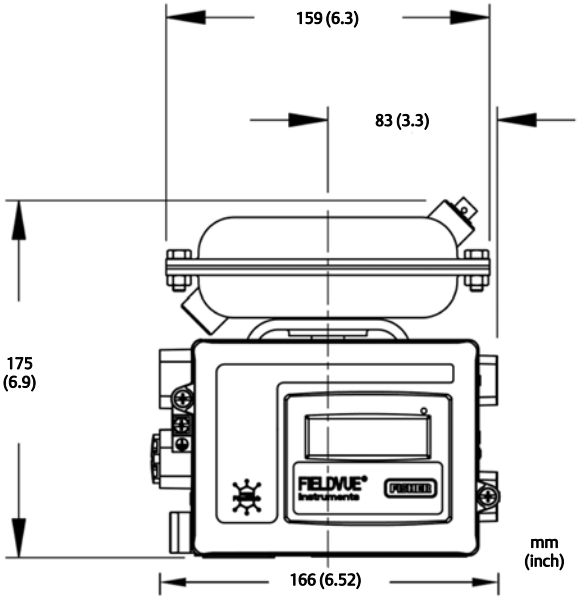

Figure 13. Baumann 16 Actuator with FIELDVUE DVC2000 Digital Valve Controller, Top View

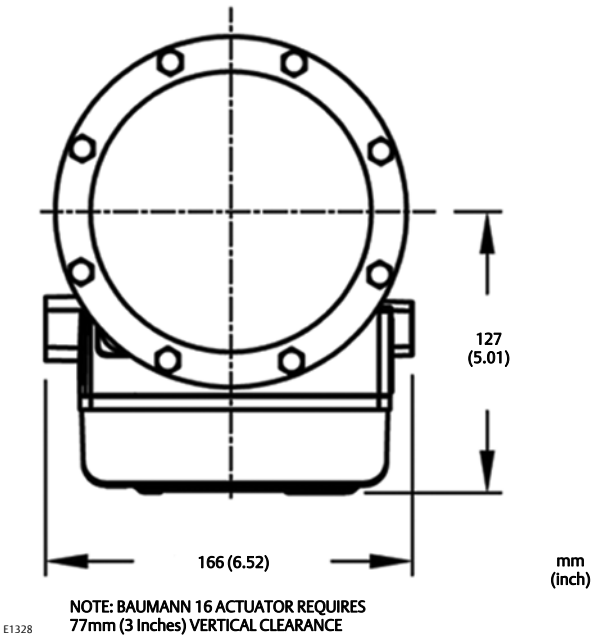

Table 3. Baumann 81000 Valve Weights

6.35 mm (NPS 1/4)		12.7 mm (NPS 1/2)	
kg	lbs	kg	lbs
1.35	3	1.82	4

Table 4. Baumann Actuator Weights

BAUMANN ACTUATOR	WEIGHT	
	kg	lbs
16	2.1	4.6

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